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## Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

## **Listing of Claims:**

Claim 1 (Canceled).

Claim 2 (Previously Presented): A morpholino-nucleotide of the formula:

$$HO \begin{pmatrix} O & O & O & O \\ \parallel & O & \parallel & O \\ P & O & P & O \\ O & O & P & O \\ O & O & P & O \\ O & O & O \\ M & O & M & N \\ R^2 & R^2 & M \end{pmatrix}$$

wherein R<sup>1</sup> represents a nucleic base, m is 0 or 1, and R<sup>2</sup> is selected from the group consisting of:

$$-(CH_2)_n-SR^3$$
,  $-(CH_2)_n-CO-R^3$ , and  $-(CH_2)_n-OR^3$ 

in which n is an integer ranging from 1 to 12 and R<sup>3</sup> is selected from the group consisting of a label, a protein, an enzyme, a fatty acid, and a peptide.

Claim 3 (Previously Presented): The morpholino-nucleotide of claim 2 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 4 (Previously Presented): The morpholino-nucleotide of claim 2 wherein R<sup>1</sup> is selected from the group consisting of:

$$H_3C$$
 $NH_2$ 
 $NH_2$ 

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Claim 5 (Previously Presented): The morpholino-nucleotide of claim 2 wherein R<sup>3</sup> is a label selected from the group consisting of radioactive products, luminescent products, electroluminescent and fluorescent products, and enzymatic labels.

Claim 6 (Previously Presented): The morpholino-nucleotide of claim 5 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 7 (Previously Presented): The morpholino-nucleotide of claim 2 wherein R<sup>3</sup> is a fluorophore.

Claim 8 (Previously Presented): The morpholino-nucleotide of claim 7 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 9 (Previously Presented): The morpholino-nucleotide of claim 2 wherein R<sup>3</sup> is selected from the group consisting of fluorescein, biotin, and rhodamine.

Claim 10 (Previously Presented): The morpholino-nucleotide of claim 9 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 11 (Previously Presented): The morpholino-nucleotide of claim 2 wherein m is 0.

Claim 12 (Previously Presented): A morpholino-nucleotide of the formula:

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wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine; m is 0 or 1; and R<sup>2</sup> is selected from the group consisting of:

$$-(CH_2)_n$$
-NH-R<sup>3</sup>,  $-(CH_2)_n$ -SR<sup>3</sup>,  $-(CH_2)_n$ -CO-R<sup>3</sup>, and  $-(CH_2)_n$ -OR<sup>3</sup>

in which n is an integer ranging from 1 to 12 and R<sup>3</sup> is selected from the group consisting of a label, a protein, an enzyme, a fatty acid, and a peptide.

Claim 13 (Previously Presented): The morpholino-nucleotide of claim 12 wherein R<sup>3</sup> is a label selected from the group consisting of radioactive products, luminescent products, electroluminescent and fluorescent products, and enzymatic labels.

Claim 14 (Previously Presented): The morpholino-nucleotide of claim 12 wherein R<sup>3</sup> is a fluorophore.

Claim 15 (Previously Presented): The morpholino-nucleotide of claim 12 wherein R<sup>3</sup> is selected from the group consisting of fluorescein, biotin, and rhodamine.

Claim 16 (Previously Presented): The morpholino-nucleotide of claim 12 wherein m is 0.

Claim 17 (Previously Presented): A morpholino-nucleotide of formula I:

wherein R<sup>1</sup> is a nucleic base selected from the group consisting of adenine, guanine, cytosine, and thymine; R<sup>2</sup> is -(CH<sub>2</sub>)<sub>4</sub>-NH-R<sup>3</sup>; and R<sup>3</sup> is -C(S)-NH-fluorescein.

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Claim 18 (Previously Presented): A morpholino-nucleotide of the formula:

$$HO \begin{pmatrix} O & O & O & O \\ \parallel & - O & \parallel & O \\ P & O & P & O \\ O & O & P \\ O & O & P \\ O & O & O \\ M & O & M \\ M & M & M \\ R^2 & M \end{pmatrix}$$

wherein R<sup>1</sup> represents a nucleic base, m is 0 or 1, and R<sup>2</sup> is selected from the group consisting of:

$$-(CH_2)_n-NH-R^3$$
,  $-(CH_2)_n-SR^3$ ,  $-(CH_2)_n-CO-R^3$ , and  $-(CH_2)_n-OR^3$ 

in which n is an integer ranging from 1 to 12 and R<sup>3</sup> is selected from the group consisting of a label, a protein, an enzyme, a fatty acid, and a peptide.

Claim 19 (Previously Presented): A morpholino-nucleotide of the formula:

$$HO \begin{pmatrix} O & O & O \\ | P & O & P & O \\ | O & O & P \\ | O & P \\$$

wherein  $R^1$  is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine; m is 0 or 1; and  $R^2$  is selected from the group consisting of:

$$-(CH_2)_n-NH-R^3$$
,  $-(CH_2)_n-SR^3$ ,  $-(CH_2)_n-CO-R^3$ , and  $-(CH_2)_n-OR^3$ 

in which n is an integer ranging from 1 to 12 and R<sup>3</sup> is selected from the group consisting of a label, a protein, an enzyme, a fatty acid, and a peptide.

Claim 20 (New): The morpholino-nucleotide of claim 18 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

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Claim 21 (New): The morpholino-nucleotide of claim 18 wherein R<sup>1</sup> is selected from the group consisting of:

$$H_3C$$
 $NH_2$ 
 $NH_2$ 

Claim 22 (New): The morpholino-nucleotide of claim 18 wherein R<sup>3</sup> is a label selected from the group consisting of radioactive products, luminescent products, electroluminescent and fluorescent products, and enzymatic labels.

Claim 23 (New): The morpholino-nucleotide of claim 22 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 24 (New): The morpholino-nucleotide of claim 18 wherein R<sup>3</sup> is a fluorophore.

Claim 25 (New): The morpholino-nucleotide of claim 24 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 26 (New): The morpholino-nucleotide of claim 18 wherein R<sup>3</sup> is selected from the group consisting of fluorescein, biotin, and rhodamine.

Claim 27 (New): The morpholino-nucleotide of claim 26 wherein R<sup>1</sup> is a natural nucleic base selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, xanthine, hypoxanthine, and 2-aminopurine.

Claim 28 (New): The morpholino-nucleotide of claim 18 wherein m is 0.

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Claim 29 (New): The morpholino-nucleotide of claim 19 wherein R<sup>3</sup> is a label selected from the group consisting of radioactive products, luminescent products, electroluminescent and fluorescent products, and enzymatic labels.

Claim 30 (New): The morpholino-nucleotide of claim 19 wherein R<sup>3</sup> is a fluorophore.

Claim 31 (New): The morpholino-nucleotide of claim 19 wherein R<sup>3</sup> is selected from the group consisting of fluorescein, biotin, and rhodamine.

Claim 32 (New): The morpholino-nucleotide of claim 19 wherein m is 0.